

# PATENT ABSTRACTS OF JAPAN

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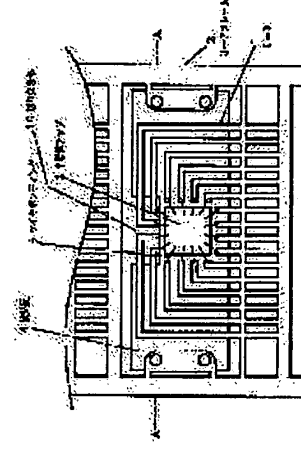
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## (54) RESIN-SEALED SEMICONDUCTOR DEVICE AND MANUFACTURE THEREOF

(57)Abstract:

**PROBLEM TO BE SOLVED:** To contrive to eliminate generation of the insulation failure of a resin-sealed semiconductor device and a defective molding of a resin, by a method wherein the parts, which are easy to come into contact with leads, of a heat sink are recessed or cutout are provided in the parts, which are easy to sag, of the leads, and the leads are prevented from coming into contact with the heat sink.

**SOLUTION:** A semiconductor chip 3 is mounted on a heat sink 4 provided with leads 1 which have cutout 10 provided in the parts, which are easy to sag, of the leads 1, and the leads 1 are connected with the chip 3 by wire bondings 5. After that, a resin is injected from resin injection holes provided in the periphery of the chip into the sink 4. After the resin is cured, the excessive parts of a lead frame 2 are cut. In this case, as the pressure of the resin which flows from the resin injection holes into the sink 4 is applied to the leads 1 from the lower parts of the leads 1 to the upper parts of the leads 1, the pressure of the resin which pushes up the leads 1 from the lower parts of the leads to the upper parts of the leads is applied to the points of the leads 1, and the head sink 4 is prevented from coming into contact with the leads 1. Accordingly, the insulation failures of a resin-sealed semiconductor device and a defective molding of the resin are prevented.



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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this application is related with the plastic-molded-type semiconductor device with which a semiconductor chip fixes on a radiator, and wirebonding of the semiconductor chip is carried out to a leadframe, and its process. [0002]  
 [Description of the Prior Art] The conventional plastic-molded-type semiconductor device is shown in drawing 2. Adhesion fixation of the semiconductor chip in which many elements are formed is electrically carried out with the heat sink. Moreover, a heat sink supplies the plastic-molded-type semiconductor device called the full mould or full pack which a support pin is fixed with a leadframe, a resin seal is carried out and a heat sink does not expose outside. This TA (2)

The semiconductor device of IPU has the advantage which may also attach and drop off on both sides of an insulator, when attaching. However, since the heat sink is covered by the resin as a fault, thermolysis is worse than the type out of which the heat sink has come outside. Therefore, the lead and the heat sink are designed so that it may not contact and may usually have 0, 5-0, and an about [ 6m ] interval so that a heat sink may come to the way of remarkable a under [ a plastic-molded-type semiconductor device ]. [0003] the resin seal of the couple which is manufacturing this type of product from a punch and female mold about the thing of the state of drawing 4 -- between public-funds types, a semiconductor chip is connected with a heat sink, a semiconductor chip is electrically connected with a lead, a leadframe is put, a resin is slushed into the cavernous section of metal mold from a resin inlet, and an unnecessary frame is cut and produced commercially after hardening (transfer mold) At this time, a resin flows early to the method of latus on a heat sink, and, as for narrow \*\*\*\* under a heat sink, a resin stops being able to flow easily. and previously, the force joined the heat sink bottom, the resin appeared in it towards the bottom of a wraparound and the upper shell of a lead, the lead and the heat sink contacted, and the bird clapper was in the defective [0004] The number of a lead tended to increase, since the package was in the inclination of a miniaturization, the lead also turned small lightweight, the lead contacted the heat sink by the pressure of a resin, and poor insulation and its bird clapper increased especially recently. [0005] Moreover, there is also the method of applying and carrying out the resin mould of the resin to the place where a lead nose of cam is likely to contact a heat sink beforehand. However, the process which sandwiches a resin will be too many needed. Moreover, there is also the method of applying an insulator to the whole excluding a field in the portion which the semiconductor chip of a heat sink fixes like publication-number 5 Hajime 67717. however, that this applies the insulator layer of a grade which costs also require and which does not start poor insulation even if it carries out and a lead contacts a heat sink is work which time and effort requires considerably -- it carries out, and since it is not improved, after

[ a mould ] air remains and a poor mould becomes easy to generate the flow of a resin

(3)

[0006]

[Problem(s) to be Solved by the Invention] This invention is an easy method and supplies the plastic-molded-type semiconductor device which made smooth the poor insulation which a lead contacts a heat sink and starts by the force in which a resin flows, and the flow of a resin, and lost the poor mould of a resin. [0007]

[Means for Solving the Problem] Drawing\_1 is one example of this invention. It prevented a lead and a heat sink contacting by affecting the flow of a resin in case a lead nose of cam is pushed up upwards and carries out a resin seal by this invention hollowing the portion which is easy to contact the lead of a heat sink, or using the force in which a resin flows on a lower shell from a crevice when preparing and carrying out the mould also of the notching. [0008]

[Function] If a hole is established in the portion which the arrow of drawing\_1 is the flow of a resin and is easy to contact the lead of a heat sink in short or notching is prepared there, a resin comes to pass along that, since the pressure of the resin which flows in from the resin inlet to the lower shell top of a lead is applied, the pressure of the resin which pushes up a lead on a lower shell is added at the nose of cam of a lead, and it prevents a lead contacting a heat sink. [0009]

[Example] Drawing\_1 is one example of this invention. This is the example which hollowed the just under [ the lead which is easy to contact most heavily ] portion. The portion into which a lead tends to hang down as a manufacturing method carries a semiconductor chip in the heat sink which prepared notching. Next, a semiconductor chip is connected with a lead by wirebonding. A resin is poured in from a resin pouring hole after that, and after hardening, an excessive leadframe is cut and it completes.

(4)

[0010]

[Effect of the Invention] The defect to whom a lead contacts a heat sink by the easy method can be prevented, and it becomes an industrial up availability size.

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CLAIMS

[Claim(s)]

[Claim 1] It is the plastic-molded-type semiconductor device characterized by preventing that the aforementioned heat sink prepares notching or a hole around a semiconductor chip in the semiconductor device by which a semiconductor chip is fixed on a heat sink, the aforementioned semiconductor chip is electrically connected with two or more leads fixed by having a predetermined interval, and a resin seal is carried out, and the aforementioned lead and a heat sink contact. [Claim 2] The plastic-molded-type semiconductor device according to claim 1 which established the aforementioned notching or the hole in the upper part of a semiconductor chip. [Claim 3] It is the process of the plastic-molded-type semiconductor device characterized by preventing that the aforementioned lead and a heat sink contact at the same time the aforementioned heat sink makes the flow of a resin good by the aforementioned notching or the hole in the manufacture method of the plastic-molded-type semiconductor device which fixes a semiconductor chip on the heat sink which has notching or a hole in the upper part of a place which carries a semiconductor chip, connects with two or more leads electrically, and carries out the transfer mold of the aforementioned semiconductor chip.

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DESCRIPTION OF DRAWINGS

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- [Brief Description of the Drawings]
- [Drawing 1] This invention one example plan
  - [Drawing 2] AA cross section of drawing 1
  - [Drawing 3] The conventional plastic-molded-type semiconductor device plan
  - [Drawing 4] AA cross section of drawing 3
  - [Drawing 5] Plastic-molded-type semiconductor device perspective diagram
  - [Drawing 6] This application heat sink 1 example which prepared notching
  - [Drawing 7] This application heat sink 1 example which prepared the hole
  - [Drawing 8] The heat sink which applied the conventional resin
- [Description of Notations]
- 1 Lead
  - 2 Leadframe
  - 3 Semiconductor CHIZUPU
  - 4 Heat Sink
  - 5 Wirebonding
  - 6 Resin Notes Population
  - 7 It is Metal Mold Top.
  - 8 Shimokane Type
  - 9 Support Pin
  - 10 Notching Section
  - 11 Hole

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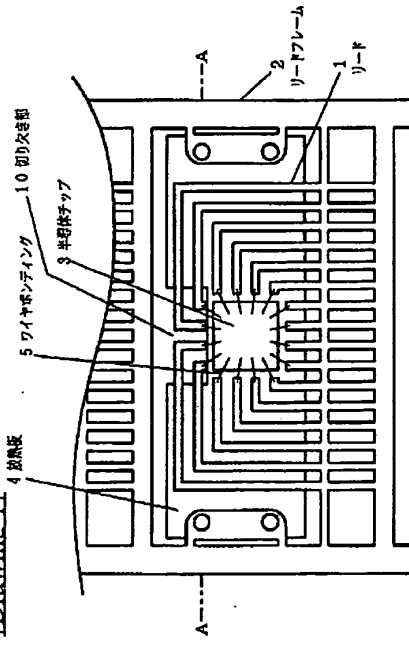
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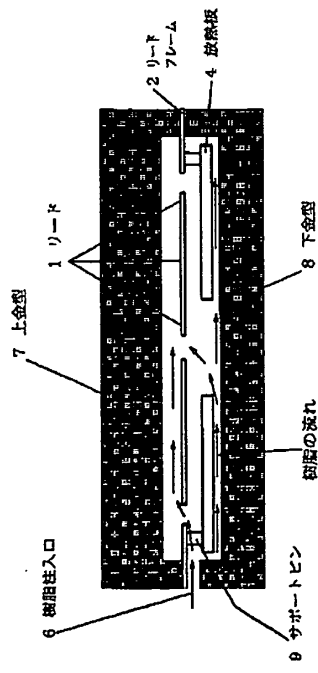
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DRAWINGS

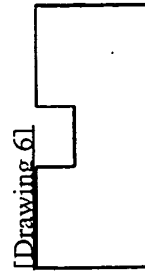
[Drawing 1]



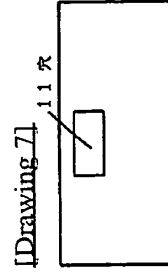
[Drawing 2]



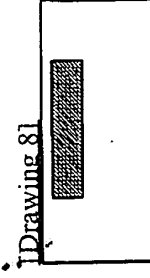
A A 断面图



切り欠き部を設けた

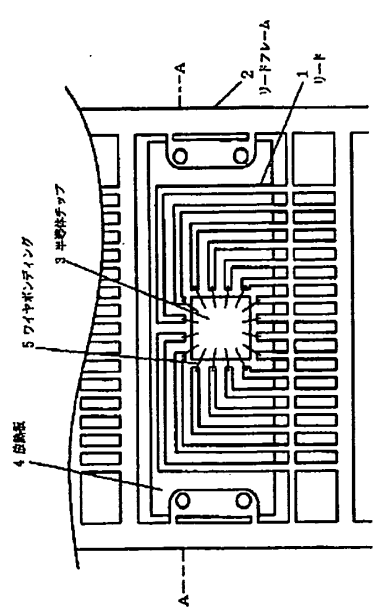


穴部を設けた 放熱板

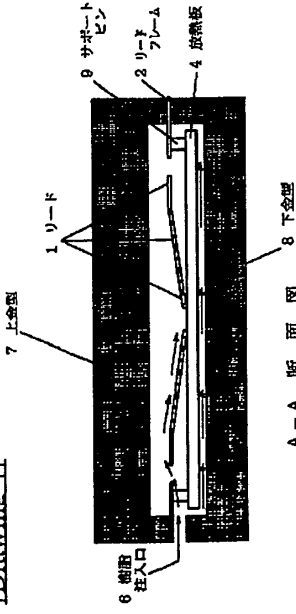


・樹脂を塗布した 放熱板

~~[Drawing 3]~~

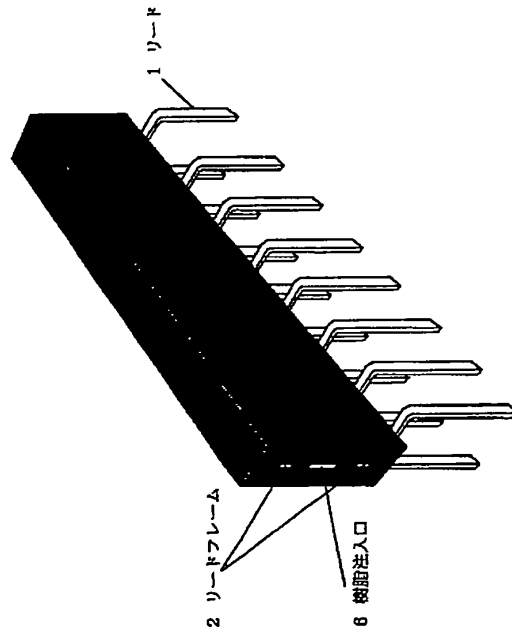


[Drawing 4]



[Drawing 5]





[Translation done.]